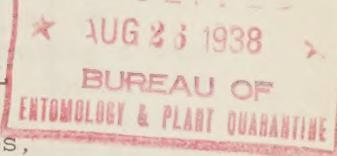


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August 1938

United States Department of Agriculture
Bureau of Entomology and Plant QuarantineEQUIPMENT AND METHODS FOR ESTIMATING
DRIED FRUIT BEETLE POPULATIONS IN SOILBy Charles K. Fisher and Dwight F. Barnes,
Division of Fruit Insect Investigations

In studying the hibernation habits of the dried fruit beetle (Carpophilus hemipterus (L)), it has been necessary to examine a considerable number of samples of soil from under fig trees in winter and spring. The method used by the writers is as follows:

(1) Lines are laid out in north, south, east, and west directions from the base of a fig tree.

(2) Beginning at 1 foot from the trunk, samples are taken at 2-foot intervals along these lines to the edge of the area covered by the branches.

(3) Samples are brought to the laboratory and washed and the insects floated out in a saturated salt solution.

For taking the samples, a soil sampler described by T. S. Coile¹ is used. It was made from a piece of high-pressure steel pipe, $3\frac{5}{8}$ inches inside diameter, case-hardened and sharpened at one end, and recessed inside to take a 1-quart ice-cream carton (fig. 1). The cost of manufacture of the sampler was \$6.

The carton is placed in the sampler bottom side up and held in place by a metal ring and pin (fig. 2). While the sampler is being driven into the soil the top is protected by a hardwood block (fig. 3). Driving the sampler fills the paper carton with a column of soil about $3\frac{5}{8}$ inches in diameter and 4 or more inches deep. When the soil is wet it is advisable to perforate the bottom of the can with three or four needle holes to allow the air to escape as the sampler is driven down. The carton is easily removed from the sampler and is then closed with the carton cover.

¹ Coile, T. S. Soil samplers. *Soil Science* 42: 139-142, illus. August 1936.

Wooden boxes partitioned to take 15 cartons and equipped with a rope handle at each end are used to carry the samples (fig. 4). The paper cartons can be used repeatedly. During the taking of 760 samples with 100 cartons only 8 were discarded.

By sampling and examining soil from the same tree or trees over a period of time the changes in the soil population can be determined. After the soil under a tree has been sampled once, subsequent samples are taken at the same distances from the trunk, but the guide line is moved over in order to miss the former sample holes.

The samples of soil are examined by washing them with a soil washer, developed by F. H. Shirck². After the fine material is washed away the insects are separated from heavier material on the screens by floating them in a saturated salt solution.

The population figures are based on the relation between the surface area of the samples and the area covered by the branches. Since the insects in the soil come from the fruit that lay on the surface during and following harvest, nearly all of them are found in the area beneath the branches.

² Shirck, F. H. Soil-washing apparatus and methods used in counting wireworm eggs, Circular ET-71, Jan. 1936.

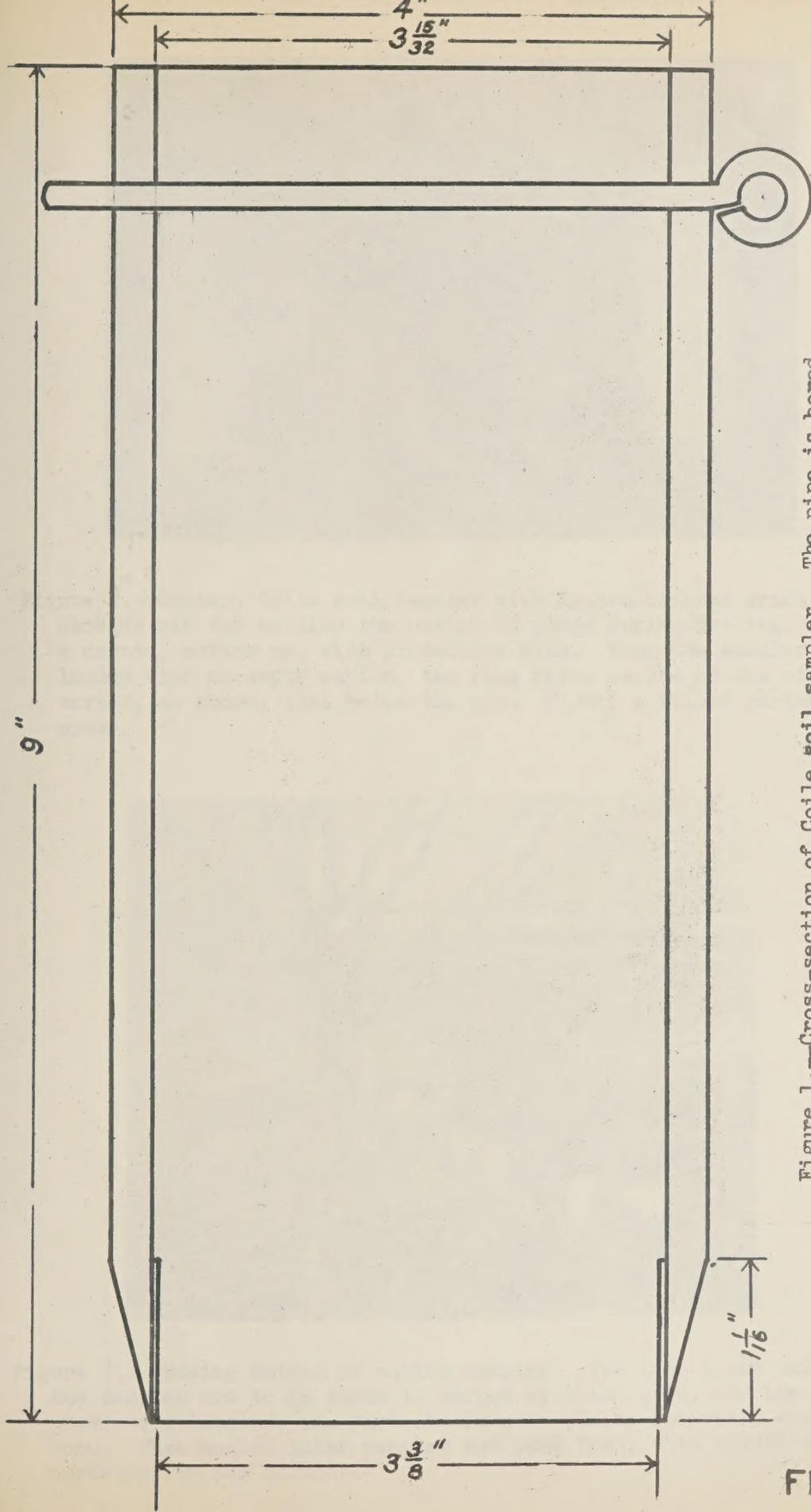


FIG. I

Figure 1.—Cross-section of Coile Soil sampler. The pipe is bored for most of its length to accommodate a 1-quart paper carton. The shoulder above the cutting edge should be wide enough to protect the edge of the top of the paper carton when the sampler is driven into the soil. The sampler holds a paper carton 6-3/4 inches high and 3-7/16 inches outside diameter.

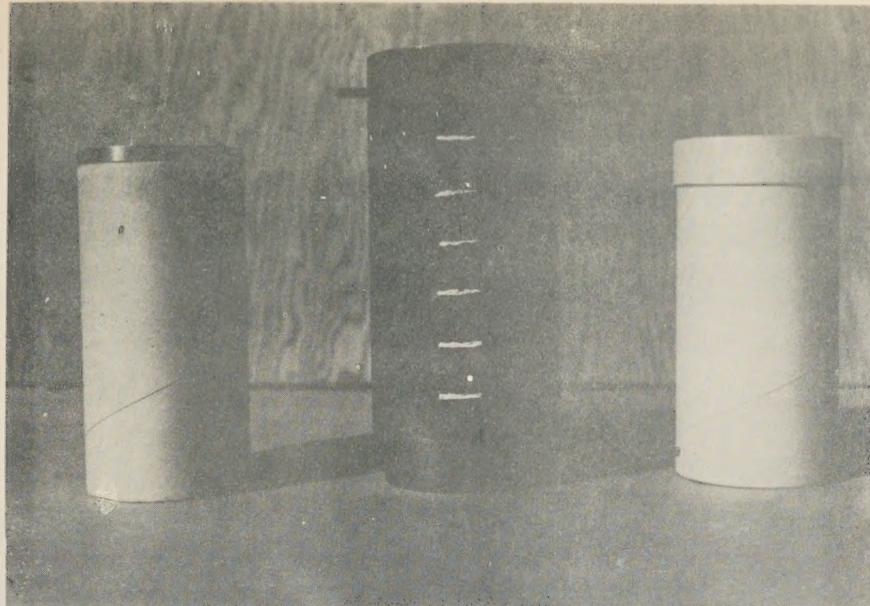


Figure 2.--Center, Coile soil sampler with 1-inch painted graduations, showing pin for holding the carton in place during driving. Left, a carton, bottom up, with protective ring. When the sampler is loaded with an empty carton, the ring rests on the bottom of the carton, as shown, just below the pin. Right, a filled carton with cover.



Figure 3.--Showing method of taking samples. The line along which the samples are to be taken is marked with the cord, and the cartons, previously labeled, are distributed at definite intervals along the cord. This method takes samples and puts them, with slight disturbance, in the cartons.

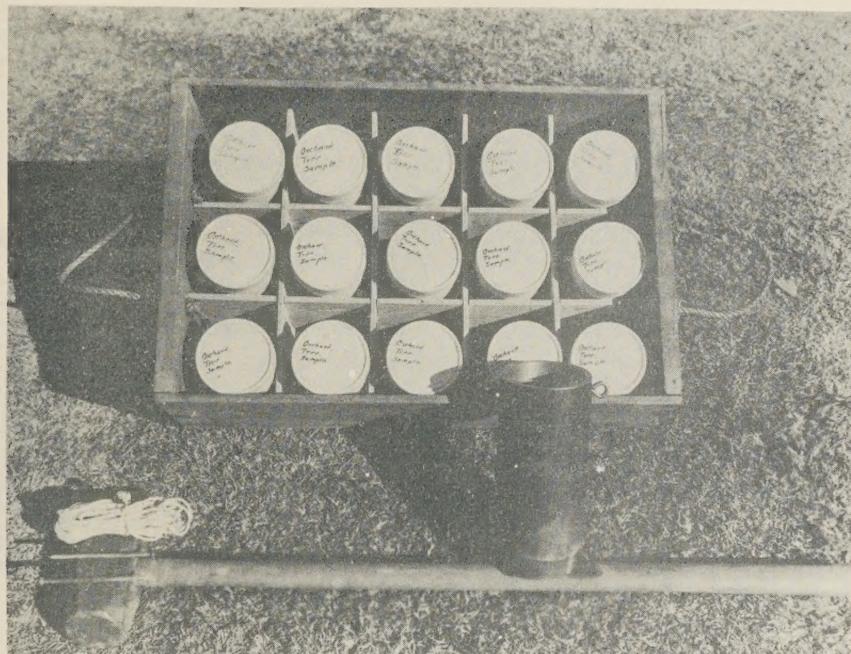


Figure 4.—Field box with 1-quart paper cartons labeled to record orchard, tree, and sample number; Coile sampler, hammer, and nails and cord for laying out lines to guide sampling.

